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THE DIFFERENTIAL IMPACT OF ENVIRONMENT AND RESILIENCE ON YOUTH OUTCOMES

Abstract

The potential positive or negative impact of the environment on young people's wellbeing may vary by a young person's level of vulnerability and the quality of the environment. To examine this relationship, analysis of a 4-wave study of 11-19-year-old youth (M_{W1} = 14.0, SD_{W1} = 1.4) from communities facing heightened challenges in Atlantic Canada (n_{W1} = 449, n_{W2} = 256, n_{W3} = 249, n_{W4} = 234) used growth curve models to test whether, at different levels of individual vulnerability (depression and conduct problems), the effect of resilience on outcomes (school engagement and risk behaviours) varied by the quality of family, school and community contexts. Results indicate that only youth with lower levels of individual vulnerability benefit from higher resilience, exhibiting more prosocial behaviour. This pattern, however, appears only when these youth reside in communities that pose significant challenges to their psychosocial development. Contrary to expectations, there were no vulnerability × resilience × family or school environment interactions. This research is the first exploration of differential impact theory (DIT). As a complement to the theory of differential susceptibility, the study's results show the positive and negative influence of young peoples' diverse social ecologies on the relationship between resilience and behavioural outcomes.

Keywords: resilience, adolescence, differential impact theory, individual vulnerability, community environment

While some researchers view resilience as an individual outcome associated with successful personal adaptation (e.g. Cornum, Matthews, & Seligman, 2011), more contextually sensitive conceptualizations have shown resilience to be a dynamic process which is facilitated through interactions between individuals and biological, psychological, social and ecological factors (e.g. Brody, Yu, & Beach, 2016; Masten, 2014; Schultze-Lutter, Schimmelmann, & Schmidt, 2016; Ungar, 2012, 2015) that in turn change behaviours such as delinquency and school engagement (Jaffee, Caspi, Moffitt, Polo-Tomas, & Taylor, 2007). For our purposes here, we have adopted this latter process-oriented understanding which is reflected in Masten's (2014) definition of resilience as "the capacity of a dynamic system to adapt successfully to disturbances that threaten system function, viability, or development" (p. 6). Resilience is, therefore, a process which is not 'one size fits all' but instead differs within and between populations based on both individual and contextual variation (Theron, Liebenberg, & Ungar, 2015).

To explain these bi-directional, multisystemic interactions associated with resilience, Ungar (2017, 2018) has postulated differential impact theory (DIT) to parallel the theory of differential susceptibility (Belsky, Bakermans-Kranenburg, & van IJzendoorn, 2007; Belsky & van Ijzendoorn, 2015; Ellis & Boyce, 2011). DIT suggests that at differing levels of individual vulnerability, a particular aspect of a person's proximal and distal environment can influence behavioural and developmental outcomes in positive or negative ways. Hypothetically, resilience promoting processes like a close relationship with a caregiver, access to quality schooling, or a supportive and cohesive community should account for more positive developmental outcomes for children at higher levels of risk, but will have little impact, or even a negative impact (e.g., overprotective parenting), on children at lower levels of risk.

To test DIT, this paper analyses data from a 4-wave study of 11-19-year-old youth from Atlantic Canada using growth curve modeling to test whether, at varying levels of individual vulnerability (their levels of depression and conduct problems), the effect of resilience-promoting processes on outcomes (school engagement and risk behaviours) varies by the quality of family, school, and community environments.

Background

Illustrative of DIT, but not identified in this way, is Beckett et al.'s (2006) comparison between children who were adopted from Romania and children who were adopted from within the United Kingdom (UK). Children who were housed in Romanian orphanages for a longer period were more likely to show larger gains in IQ scores as a result of the facilitative environment of their adopted homes and schools than children housed for less time in Romanian orphanages or children who were adopted from the UK. As would be predicted by DIT, the children facing the greatest vulnerability were the ones most influenced by changes to their environment. This same pattern can be found in other studies from very different contexts. For example, Bernazzani and Tremblay's (2006) intervention to reduce community and family violence in Medellín, Colombia, showed that children experiencing high and low levels of vulnerability were both influenced by the environment but in different directions. The intervention in Medellín led to lower levels of problem behaviours among the most socially disadvantaged youth but had no impact and even a negative impact on children who were less exposed to community and family violence (Duque, Klevens, Ungar, & Lee, 2005). Changes to the environment, therefore, had a different effect on those at high and low levels of individual risk, leading to better outcomes for children experiencing greater vulnerability and worse outcomes for those experiencing less vulnerability.

Other studies, however, while documenting the differential impact of supportive resources on human development, have identified very different patterns of interaction between risk exposure, supports and outcomes. Jain and Cohen's (2013) study of early adolescents, for example, showed that family support and positive peer exposure were associated with later behavioural adaptation for all participants, but particularly for those who were not exposed to violence during childhood (lower risk youth), as compared to those who had witnessed violence. A similar relationship between risk and resilience was also found among adolescents who experienced interpersonal trauma (Gallus, Shreffler, Merten, & Cox, 2014) where the group least exposed to trauma benefitted most from parent-child connectedness. Beyond the family, aspects of a supportive peer and school context have also shown the same pattern of differential impact, with each set of relationships contributing to reduced externalizing behaviours among school-aged children with conduct problems, especially those with lower initial levels of behavioural challenges; those with high initial levels of conduct problems showed less of a decline in externalizing behaviours (Toupin, 2016).

Other studies, meanwhile, show another possible pattern in which being neither high nor low risk increases the impact of the environment on developmental outcomes. Klebanov and Brooks-Gunn (2006) conducted an intervention to improve the environment of low birth weight children that resulted in sustained gains in IQ only for children from families facing moderate risk; neither high nor low risk children showed sustained improvement.

Results such as these suggest many nuanced patterns to how populations with different levels of exposure to adversity respond to their environments, demonstrating positive and negative (or neutral) developmental outcomes (Ungar, 2018; Chandler & Lalonde, 1998; DuMont, Ehrhard-Dietzel, & Kirkland, 2012; Klasen et al., 2010). For this reason, it remains

unclear whether changes to a child's environment always have a greater positive effect on outcomes for the most vulnerable young people or if a protective factor could actually have a negative or neutral (differential) impact on development among children at low and high levels of individual risk. Taken together, these studies demonstrate that the impact of the environment on children's outcomes will differ based on the level and type of vulnerability experienced by the child and the nature of the protective and promotive processes employed by the child and the systems that surround the child. DIT may help to explain these patterns. The theory makes clear that the same variable can have varied effects on outcomes when researchers disaggregate their data and investigate interactions between vulnerability and resources.

For our purposes, we have focused here on two sources of individual vulnerability that have shown sensitivity to resilience-promoting processes facilitated by a child's social ecology. Both adolescent depression and conduct problems tend to persist into adulthood (Herrenkohl et al., 2010; Pine, Cohen, Gurley, Brook, & Ma, 1998) and are associated with a range of immediate and continuing difficulties such as worse engagement with school (Colman et al., 2009; Glied & Pine, 2002; Simons-Morton & Davis Crump, 2009) and higher levels of risk behaviours such as drug use or risky sexual activity (Herrenkohl et al., 2010; van Dorn, Volavka, & Johnson, 2012; Zullig & Divin, 2012). It remains relatively unclear, however, the extent to which one's family, school, and community exert differing amounts of influence on patterns of school engagement and risk behaviours over time when one accounts for the severity of the disorder and the availability of protective processes associated with resilience.

The study reported in this paper is an exploratory investigation of DIT, examining how the quality of the environment affects youth outcomes at different levels of risk exposure. To conduct our analysis, we used data from the Pathways to Resilience Study (Ungar, Liebenberg,

Armstrong, Dudding, & van de Vijver, 2012), a longitudinal study of young people's risk exposure, individual, relational and contextual resilience, service use patterns, and behavioural outcomes. Based on our review of the literature, we hypothesized that youths' family, school, and community contexts would have a differential impact on behavioural outcomes (school engagement and risk behaviours like substance use and risky sexual behaviour) depending on the level of individual vulnerability and resilience. Though depression and conduct disorder are often included as dependent measures (outcomes) in studies of resilience, they can also be used to indicate vulnerability to a socially toxic or under-resourced environment, which in turn can affect young people's engagement in school and risk behaviours such as delinquency (Heim & Binder, 2012; Stewart, Sherry, Comeau, Mushquash, Collins, & Van Wilgenburg, 2011). Resilience (protective factors and processes) are known to mediate and/or moderate this relationship between mental health problems and behavioural outcomes (Wingo, Wrenn, Pelletier, Gutman, Bradley, & Ressler, 2010). Figure 1 shows the relationship between the variables studied. Given the conflicting findings over the direction of this effect (e.g. Beckett et al., 2006; Jain & Cohen, 2013), it is not clear, however, which aspects of the environment will have more of an effect (positive or negative) on youth who are more or less vulnerable.

[Insert Figure 1 here]

Method

Participants

As part of the Pathways to Resilience Study participants were sampled from 12 communities in Eastern Canada (Nova Scotia and Labrador). The sample included 449 youth at

W1, 256 at W2, 249 at W3, and 234 at W4. See Table 1 for sample details at each wave, and for information on the study variables.

Participants were included in the study if they lived in communities identified by local advisory committees as having youth with heightened challenges such as higher levels of community and domestic violence, lower socio-economic status, and a high proportion of visible (culturally and racially diverse) minorities. At W1, researchers met with school principals and community leaders from organizations located in the communities identified by the local advisory committees to gain consent for research to be held in their schools/organizations. Researchers informed all youth at the schools/organizations about the study and then came back on a separate day to administer the questionnaire to small groups of participants who agreed to participate. All these procedures passed review by Dalhousie University's Research Ethics Board prior to the commencement of the study.

[Insert Table 1 here]

Procedure

This study involved 4 waves of data collection, with each participant completing the questionnaire at approximately 12-month intervals. Wave 1 data collection began in July 2009 and recruitment lasted until October 2010. Wave 4 data collection was finished in January 2014. Although the total period of data collection was nearly five years, individual participants were involved for a maximum of four years (four waves, with each wave one year apart). As would be expected, the high levels of vulnerability of the sample population in these specific communities resulted in considerable attrition after W1.

Questionnaires were completed individually by youth in small group data collection sessions that lasted between 60 and 90 minutes. To avoid problems stemming from low literacy, all questions were read out loud to participants. A small stipend was paid to each young person at each contact.

Measures

Time-invariant predictors.

Age and sex. Our two time-invariant predictors were collected through participant report at Wave 1. They are age (M = 14.0, SD = 1.38) and sex (0 = male, 1 = female).

Time-varying predictors.

Individual vulnerability. Youths' level of depression was measured using the 12-item Centre for Epidemiological Studies Depression Scale (CES-D; Poulin, Hand, & Boudreau, 2005). Items include, "I felt lonely" and "I had crying spells" (0 = Rarely or none of the time, 3 = All of the time). Conduct problems were measured using the 5-item Strengths and Difficulties Questionnaire (SDQ) conduct problems subscale (Goodman, 1997). Items include, "I get very angry" and "I take things that are not mine" (0 = Not true, 2 = Certainly true). To create the individual vulnerability scale, we first standardized scores on the CES-D to match the SDQ, with higher scores indicating more depressive symptoms. We then combined these two measures for a possible score ranging between 0 and 20, with higher scores indicating greater individual vulnerability (M_{W1} = 3.9, SD_{W1} = 2.7, α_{w1} = .81, range$_{W1}$ = 0 – 15.78; M_{W2} = 3.3, SD_{W2} = 2.3 α_{w2} = .81, range$_{W2}$ = 0 – 10.89; M_{W3} = 3.4, SD_{W3} = 2.5 α_{w3} = .85, range$_{W3}$ = 0 – 13.67; M_{W4} = 3.6, SD_{W4} = 2.7, α_{w4} = .88, range$_{W4}$ = 0 – 14.56). This composite measure of vulnerability had good

internal consistency at all time points. Depression and conduct problems were significantly correlated within each time point: *r*s range from .29 to .39.

Resilience. Resilience was measured using the 28-item Child and Youth Resilience Measure (CYRM; Ungar & Liebenberg, 2005, 2011), which measures social ecological resilience. Items include, "I am aware of my own strengths", "My caregiver(s) stand(s) by me during difficult times" and, "I am treated fairly in my community", with responses ranging from 1 ("Not at all") to 5 ("A lot"). The final score is a composite of three sources of strength: individual capacities, relationship with caregivers, and contextual resources. Higher scores indicate greater resilience (possible range: 28 to 140, $range_{W1}$ = 62 – 140, $range_{W2}$ = 60 – 140, $range_{W3}$ = 73 – 140, $range_{W4}$ = 69 – 139).

Ecological context. Although within the larger body of literature in social psychology, researchers have come to view a person's environment as comprised holistically of physical, interpersonal, and sociocultural aspects (Sallis, Owen, & Fisher, 2008), we have narrowed our measures to focus more specifically on family, school, and community environment factors given that they are most proximal to young people's development.

Family environment. Family environment was operationalized as the level of parental affection, quality of the parent-child relationship, and crowding. Youth were asked to think of a person who was most like a mother to them and a person who was most like a father to them (these could be biological parents, stepparents, foster parents, grandparents, or another caregiver). They were then asked, "Thinking of the mother and father figures you identified, how much affection do you receive from each of these people?" (0 = Not at all or "I am not in contact with my mother/father", 3 = A great deal). They were also asked, "Overall, how would you

describe your relationship with the mother and father figures you identified above?" (0 = "I am not in contact with my mother/father", 1 = Not very close, 3 = Very close). Higher scores indicate a more positive family environment.

Crowding was computed by dividing the number of people (adults and children) in a household by the number of bedrooms in that household. Crowding is a well-established indicator of socioeconomic status (Galobardes, Shaw, Lawlor, Lynch, & Smith, 2006; Statistics Canada, 2015). The two mother-related questions, the two father-related questions, and the crowding question were then standardized with a maximum score of 1 for each, for a total possible score ranging from 0 to 5 ($range_{W1}$ = .16 – 4.88, $range_{W2}$ = .10 – 4.28, $range_{W3}$ = .06 – 4.25, $range_{W4}$ = 1.16 – 4.38).

School environment. School environment was measured using 2 items: "Teachers at my school who see students hurting each other will do something to stop them" (1 = Does not describe me at all, 5 = Describes me a lot) and "How would you describe your school (or the last school you attended)?" (1 = My school is/was a bad place to be, 5 = My school is/was a good place to be). Higher scores indicate a more positive school environment (possible range: 2-10, $range_{W1}$ = 2 – 10, $range_{W2}$ = 2 – 10, $range_{W3}$ = 2 – 10, $range_{W4}$ = 4 – 10).

Community environment. Community environment was measured using 6 questions from the Boston Neighborhood Survey (Schmidt et al., 2014). This measure includes 5 items such as, "People in my neighbourhood/community can be trusted" and the reverse scored item "There is litter, broken glass, or trash around my community/neighbourhood" (1 = Does not describe my neighbourhood, 4 = Describes my neighbourhood a lot) and one item "How safe do you consider your neighbourhood to be?" (0 = Very safe, 2 = Not safe at all) which was recoded to range from

0 to 4. Higher scores indicate safer communities and greater community efficacy. Although participants were sampled from communities identified as being at higher risk, mean scores (Table 1) and ranges suggest that most participants viewed their communities as being positive environments but there was considerable variability within the sample (possible range: 5 – 24, $range_{W1}$ = 5 – 24, $range_{W2}$ = 5 – 24, $range_{W3}$ = 8 – 24, $range_{W4}$ = 8 – 24).

Youth outcomes.

School engagement. School engagement was measured by summing 5 questions from the National Longitudinal Survey of Children and Youth. First, each item was standardized (range 0 to 1). Items were then summed for a possible school engagement score between 0 and 5, with higher scores indicating greater engagement with school. Questions included "Are you in school now or doing correspondence classes?" and the reverse scored "During the last 12 months (or during the last full school year you attended), how many times did you get suspended?" Higher scores indicate greater engagement with school.

Risk behaviours. Risk behaviours were measured using 9 items from the 4-H study of Positive Youth Development (Phelps et al., 2007; Theokas & Lerner, 2006). Youth were asked how many times in the past year they had done the following things: smoked cigarettes; used chewing tobacco or snuff; drank beer, wine, wine coolers, or hard liquor; sniffed glues, sprays, or gasses; used marijuana or hashish; used any other drug; taken steroids; had sexual intercourse; and had unprotected sexual intercourse (0 = Never, 3 = Regularly). Higher scores indicate more risk behaviours.

Analysis

Descriptive statistics were used to identify participants' demographic characteristics; family, school, and community environments; depression; conduct problems; resilience; school engagement; and risk behaviours. See Table 2 for correlations between study variables at all time points. Following descriptives and correlations, we used two-level growth curve modeling in SPSS v23 to examine whether a youth's resilience had a differential impact on outcomes like school engagement and risk behaviours depending on their family, school, and community environments and their levels of individual vulnerability. Growth curve modeling is appropriate for use with this dataset as we have repeated measurements (level one) nested within participants (level two). We lagged the data so that predictors at one wave were predicting school engagement and risk behaviours at the subsequent wave. All continuous predictor variables were standardized to have a mean of 0 and a standard deviation of 1. Because we conducted multiple analyses, we set a more stringent significance level of .01 for the growth curve analyses.

[Insert Table 2 here]

The predictors in this study are divided into two categories: 1) characteristics of participants collected at W1 which remain the same at all waves (e.g. sex and age at baseline) which are time-invariant and 2) characteristics which change over time (e.g. family environment, school environment, community environment, vulnerability, and resilience) which are time-varying predictors. The use of this second type of predictor allows us to examine whether within-person fluctuations in these variables predict changes in school engagement and risk behaviours in the following wave.

A series of growth curve models were fit to the data in which trajectories of school engagement and risk behaviours over time were modeled as linear functions of age, sex,

environmental context, individual vulnerability, and resilience, with allowance for within-person variability in the intercept and slope over time. First, we fit the level one models by running unconditional linear growth models (Table 2) to examine individual changes over time in the outcome variables. The initial level of the outcome variable (the intercept) and time were allowed to vary across individuals, such that each could have their own intercept and linear growth rate. This model was of the form:

Level 1:

$$Y_{ti} = \pi_{0i} + \pi_{1i} \times (\text{Wave}) + \varepsilon_{ti}$$

Level 2:

$$\pi_{0i} = \beta_{00} + r_{0i}$$

$$\pi_{1i} = \beta_{l0} + r_{1i}$$

where π_{0i} is the intercept, π_{1i} is the linear growth slope (rate of change), and ε_{ti} represents the residual of person *i*'s score at time *t* from their model-predicted score at time *t*. r_0 and r_l are the level two residuals, which represent the deviation of an individual's intercept and slope from the mean intercept and slope.

These models provide estimates for the average intercept and slope of the outcome variables (school engagement and risk behaviours) which allowed us to understand the level and direction of change in these variables over time. Subsequently, we fit combined models with our time-invariant predictors (sex, age at baseline) and time-varying predictors (family environment, school environment, community environment, individual vulnerability, resilience) for the two outcomes (Table 3). We included all three environments to examine the effect of each over-and-

above the others. Differences in slope were investigated through testing interactions between participants' level of individual vulnerability and the quality of their environment (Table 4). The final model, including the interactions was:

Level 1:

$$Y_{ti} = \pi_{0i} + \pi_{1i} \times (\text{Wave}) + \pi_{2i} \times (\text{Vulnerability}) + \pi_{3i} \times (\text{Resilience}) + \pi_{4i} (\text{Family Environment}) + \pi_{5i} \times (\text{School Environment}) + \pi_{6i} \times (\text{Community Environment}) + \pi_{7i} \times (\text{Resilience} \times \text{Environment}) + \pi_{8i} \times (\text{Resilience} \times \text{Vulnerability}) + \pi_{9i} \times (\text{Vulnerability} \times \text{Environment}) + \pi_{10,i} \times (\text{Vulnerability} \times \text{Resilience} \times \text{Environment}) + \varepsilon_{ti}$$

Level 2:

$$\text{Intercept: } \pi_{0i} = \beta_{00} + r_{0i}$$

$$\text{Slope: } \pi_{1i} = \beta_{10} + \beta_{11}(\text{age}) + \beta_{11}(\text{sex}) + r_{1i}$$

$$\text{Effects: } \pi_{2\ldots10,i} = \beta_{2\ldots10,0}$$

where Y_{ti} is the predicted outcome for person i at time t, π_{0i} is the intercept, π_{1i} is the linear growth slope, and ε_{ti} represents error in the estimate growth within an individual. We include time-varying predictors at the within-person level (level one) with, for example, π_{2i} being the unique effect of vulnerability on the outcome. Coefficients for all effects were estimated using maximum likelihood estimation and models used a scaled identity covariance structure.

The participants were intentionally drawn from communities facing significant disadvantage which required researchers to use a number of established techniques to retain marginalized participants (McKenzie, Peterson Tulsky, Long, Chesney, & Moss, 1999). The majority of participants did not, however, participate at all four waves: 135 participants

completed one wave, 67 completed two waves, 69 completed three waves, and 178 completed four waves (N = 449). Although optimally all participants would take part at each wave, growth curve models do not require an equal number of assessments and are well-suited to datasets with missing data (Shek & Ma, 2011). Despite attrition, there was no change in participants' family environment ($F(217, 494.78) = 2.51$, $p > .05$), school environment ($F(2.62, 436.66) = .42$, $p > .05$) or community environment ($F(3, 252) = .32$, $p > .05$) scores across the four waves of the study. This suggests that retained participants come from similar family, school, and community environments as those who left the study. There was a change in conduct problems ($F(3, 480) = 12.70$, $p < .001$), depression ($F(2.60, 371.16) = 7.85$, $p < .001$), resilience ($F(3, 351) = 3.90$, $p < .05$), school engagement ($F(2.49, 400.27) = 7.04$, $p < .01$), and risk behaviours ($F(2.01, 315.84) = 54.24$, $p < .001$) across the waves.

Results

Unconditional Growth Models

[Insert Table 3]

As seen in Table 3, the intercepts and rates of change for the outcome variables were reliably different from zero. As evidenced by the linear change scores being significant and negative, participants became less engaged with school over time. By contrast, risk behaviours were characterized by significant positive linear change, suggesting that participants engaged in more risk behaviours over the waves.

Combined Models

[Insert Tables 4 and 5]

[Insert Figures 2 and 3]

Controlling for the effects of all other predictors, baseline school engagement was higher for younger participants. When participants had higher levels of individual vulnerability at one time point, they tended to have lower school engagement at the subsequent time point (Table 4). There were no significant vulnerability × resilience × family or school environment interactions for either school engagement or risk behaviours; model tables including those interactions are available upon request. There was a significant vulnerability × resilience × community environment interaction on school engagement (Table 5, Figure 1). Contrary to our hypothesized interactions, however, resilience had only a limited effect on school engagement of adolescents who had higher levels of vulnerability, regardless of their community environments. Specifically, participants who came from poorer quality communities but who had low levels of individual vulnerability were slightly more likely to be engaged with school at the subsequent time point if they scored higher on resilience. In keeping with a theory of differential impact, though counter to what would be expected based on previous research, participants who had high quality community environments and low levels of individual vulnerability were *less* likely to be engaged with school when they were *more* resilient.

Controlling for the effects of all other predictors, baseline risk behaviours were higher for older participants. When participants had higher levels of individual vulnerability at a time point, they tended to engage in more risk behaviours at the subsequent time point (Table 4). There was a significant vulnerability × resilience × community environment interaction on risk behaviours (Table 5, Figure 2). As with school engagement, the resilience and community environments of participants who were more individually vulnerable did not have an effect on their risk behaviours. Resilience reduced the risk behaviour of adolescents who had low levels of

individual vulnerability and came from poor quality community environments but predicted *increased* risk behaviours among adolescents who were less vulnerable and came from good quality community environments.

Discussion

These growth curve analyses show that the relationships between vulnerability, resilience and youth outcomes such as school engagement and risk behaviours can be explained better when the differential impact of family, school, and community environments are accounted for. In general, our results indicate that there is a differential impact of environments on the relationship between resilience and behavioural outcomes depending on the level of internalizing and externalizing problems, but that the pattern of this effect is mixed. For example, in some instances enhanced resilience decreased positive developmental outcomes such as school engagement and increased risky behaviours by young people, but only for those living in more supportive community environments. Further, neither resilience nor the community environment affected later school engagement or risk behaviours for young people who scored high on depression and conduct problems. Such findings suggest that youth with different degrees of vulnerability are affected by their environments in different ways. Counter to what we expected, there was no interaction by family or school environment, suggesting that communities may be a particularly important moderator of young people's outcomes, especially for young people who are less individually vulnerable. For more depressed and conduct disordered young people, it is unclear as to why the quality of their community did not, as we expected, influence the relationship between resilience and behavioural outcomes.

Our findings challenge the suggestion that youth exposed to more vulnerability should be more affected by their environments than youth who are less vulnerable (Ungar, 2017). Indeed, we saw the opposite pattern. Resilience had little effect on young people with high levels of individual vulnerability. We speculate that this may have been due to how we operationalized vulnerability. While both depression and conduct problems tend to persist from adolescence into adulthood (Moffitt, 1993; Pine et al., 1998) and cause significant difficulties throughout the lifespan, other types of vulnerability such as learning challenges or exposure to family violence may show a clearer pattern of the differential impact of family, school and community contexts by level of risk exposure. Future research, purposefully designed to test DIT, is needed to explore this and other patterns.

The contextually specific pattern of differential impact that we report for less vulnerable youth is not unlike the complex patterns observed in diathesis-stress and differential susceptibility studies (Belsky et al., 2007), except that the emphasis is on the moderating effect of the young person's social context rather than an individuals' genotype or phenotype. In the same way that differential susceptibility studies have shown that a factor which benefits a child at lower levels of risk may disadvantage a child at higher levels of risk (and vice-versa), so too can we observe the differential impact of social environments on children's functional outcomes. In the present study, different contexts appear to interact with different profiles of young people to produce diverse outcomes, with the same increase in resilience predicting both positive and negative behaviours depending on children's interactions with their environments.

Such findings have important implications for both public health intervention and research. With regard to public health, these findings support interventions that improve the quality of children's environments, especially children who show no clinically significant

challenges. It also shows that large scale interventions to bolster resilience (which are becoming more commonplace at the level of communities—Chi, Williams, Chandra, Plough, & Eisenman, 2015) may not be effective unless tailored to the needs of children at high and low levels of risk. With regard to future research on resilience, it too should pay closer attention to the qualities of the environment, the qualities of individuals, and whether risk profile changes their relationship. The assumption that any aspect of resilience will always be positive, or at least benign, is no longer possible. Our findings show that well-designed research will need to disaggregate samples by risk profile and delve deeper into understanding which patterns of interaction are of benefit to children and which may do more harm than good. This is the growing contribution DIT is making to developmental science, public health and the study of coping under stress.

In summary, then, the quality of a young person's community (but not their family or school) was shown to influence the relationship between individual vulnerability, resilience and outcomes like school engagement and risk behaviours. This pattern, though, was only significant for youth with lower levels of depression and conduct problems. For these young people, the impact of a poorly functioning community appears to have negatively affected only those young people who scored low on resilience. They reported higher rates of risk behaviours and less school engagement. When these same young people from these same poorly functioning communities reported high resilience, their outcomes were improved as well. It appears that resilience moderates the impact of a poorly functioning community for youth without individual vulnerabilities. Oddly, however, young people with the same low level of individual vulnerability living in better functioning communities tended to have better behavioural outcomes (they remained engaged in school and had fewer risk behaviours) if they scored low on resilience. This compensatory protective function of the community, however, became a risk

factor for young people with low vulnerability who scored higher on resilience. These youth reported lower levels of school engagement and more risk behaviours. It is in this criss-crossing pattern of results observed in Figures 2 and 3 that we find evidence for the differential impact of a community environment. While an advantage for youth without internalizing and externalizing problems that report low levels of resilience, it is just as much a disadvantage for these same young people if they report high resilience.

Though counter-intuitive, it may be that young people were more likely to be disengaged from school and engage in risky behaviours because the presence of resilience-supporting resources (as measured by the CYRM) gave them the strength to act out and misbehave knowing that they were relatively safe. Resilience, as measured in this study and by most other research teams, is usually assumed to indicate higher levels of self-efficacy, self-esteem, perseverance, and engagement with supportive peers (Masten, 2014; Panter-Brick et al., 2017; Vaillant, 2015). Resilient youth in safer community environments may feel secure enough to rebel against the expectations of those in their communities. While replication is necessary, our results suggest that caution is required before we bolster the resilience of children with low levels of individual vulnerability (depression and conduct problems) who already have the advantage of supportive community environments. The result could be an empowered, but potentially delinquent child. While on the surface, building resilience is of benefit, DIT points to a nuance in how resilience processes affect young people: under certain conditions, resilience may lead to worse outcomes. More research is needed to explain the differential impact of communities and their interactions with the processes associated with resilience.

Limitations

While our results point to the important impact of environments on youth outcomes, one limitation of this study is its relatively specific focus on family, school, and community. We have not included other environments which may affect youth, such as their physical surroundings or their peer groups. Due to the exploratory nature of this examination – in which we used available data to test a hypothesis – some of the measurements are imprecise. We have chosen to combine depressive and conduct disorder symptoms as a measure of vulnerability because we were interested broadly in individual vulnerabilities. Further, the measure of school environment is comprised of only two questions and school engagement of only five questions. These variables were chosen because of their availability within our dataset. Further research is merited using additional vulnerability measures, environmental contexts, as well as more established scales. Additionally, given the multisystemic components that constitute the CYRM (individual, relational, and contextual aspects of resilience are measured; Liebenberg, Ungar, & Van de Vijver, 2012), additional study is needed to determine if measurement limitations affected results. Despite these limitations, our results suggest the possibility that interventions to increase resilience would be most efficacious with youth without depression or conduct problems living in less supportive community environments.

Conclusion

Regardless of which patterns of interaction we identified with our findings, this research illustrates the importance of young peoples' social ecologies to their development. Interventions to bolster resilience may be most beneficial for youth whose family, school, and community environments are lower quality. Findings point to the necessity of understanding youth in context in order to most effectively promote their development. Protective processes appear to be heterogenic – what is protective in one context could be a vulnerability in another. Analysis of

the differential impact of the environment on psychosocial development is an emerging field that could complement well studies of individual strengths and vulnerability, shifting the search for nuanced descriptions of the individual to more detailed analysis of environments and their impact on human development.

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Table 1. *Participants' demographics and variable information*

	Wave 1 (*N* = 449)	Wave 2 (*N* = 256)	Wave 3 (*N* = 249)	Wave 4 (*N* = 234)
Demographics				
Age	14.0 (1.4)	15.2 (1.4)	16.0 (1.4)	16.9 (1.3)
Male (%)	47.9	42.6	42.3	49.0
Race (%)				
White	48.6	53.1	51.0	54.9
Aboriginal or Native	26.4	29.6	30.0	24.9
Mixed Race	14.9	9.1	10.1	10.3
Black	5.4	4.9	4.5	4.7
Other	4.7	3.3	4.4	5.2
Living Arrangement (%)				
Married Parents/Guardians	59.4	60.5	56.2	54.7
Single Parent/Guardian	20.6	19.1	21.3	23.5
Cohabiting Parents/Guardians	14.8	12.5	13.7	11.5
Supervised Housing	0.0	0.8	0.8	0.4
On Own	0.0	1.2	0.8	2.1
With Friends	0.0	0.8	0.4	0.4
Other	5.2	5.1	6.8	7.4
Study Variables				
Family Environment	3.6 (.8)	3.5 (.9)	3.4 (.9)	3.5 (.7)
	α = .85	α = .89	α = .93	α = .90
School Environment	8.1 (1.6)	8.2 (1.7)	8.2 (1.5)	8.3 (1.5)
Community Environment	17.1 (3.7)	17.6 (3.6)	17.3 (3.5)	16.9 (3.7)
	α = .71	α = .72	α = .70	α = .75
Resilience	116.9 (13.2)	116.4 (12.4)	117.8 (12.4)	115.6 (13.9)
	α = .88	α = .88	α = .89	α = .91
School Engagement	4.6 (.7)	4.7 (.6)	4.6 (.7)	4.5 (.8)
	α = .63	α = .62	α = .63	α = .68
Risk Behaviours	2.0 (3.3)	2.5 (3.4)	3.3 (3.9)	3.9 (4.1)
	α = .76	α = .72	α = .74	α = .76
Depression	7.6 (5.7)	6.4 (5.3)	7.3 (6.1)	8.8 (7.2)
Conduct Problems	1.8 (1.6)	1.5 (1.4)	1.4 (1.4)	1.2 (1.3)

Note: Some of the percentages may not add to 100% due to rounding. Given that the use of Chronbach's alpha can be problematic for scales with a small number of items, Chronbach's alphas were used to measure internal reliability when measures had ≥6 items and split-half reliability was used for measures which had ≤5 items. We did not calculate the internal reliability of school environment because this was measured using two items.

Table 2. *Correlations between study variables at the four waves*

	Wave 1						**Wave 2**					
	Vuln	Family	School env	Comm	School eng	Risk	Vuln	Family	School env	Comm	School eng	Risk
W1												
Vulnerability	-											
Family	-.26**	-										
School env	-.28**	.14*	-									
Comm	-.35**	.21**	.30**	-								
School eng	-.27**	.13*	.04	.19**	-							
Risk	.33**	-.19*	-.07	-.22**	-.54	-						
W2												
Vulnerability	.59**						-					
Family	-.23**	.38**	.14*	.18*	.33**	-.27**	-.32**	-				
School env	-.26**	.05	.29**	.14	.18*	-.14*	-.44**	.35**	-			
Comm	-.32**	.15*	.21*	.59**	.14	-.06	-.36**	.27**	.36**	-		
School eng	-.18*	.17*	.02	-.03	.72**	-.60**	-.26**	.13*	.18*	-.02	-	
Risk	.26**	-.26**	-.07	-.08	-.44**	.85**	.30**	-.28**	-.21*	-.08	-.57**	-
W3												
Vulnerability	-.42**	-.21*	-.20*	-.01	-.15*	.16*	.54**	-.24**	-.27**	-.11	-.19*	.22*
Family	-.22**	.33**	.10	.13	.15*	-.37**	-.38**	.53**	.29**	.19*	.32**	-.37**
School env	-.13	.13*	.40**	.26**	.05	-.08	-.31**	.21*	.52**	.29**	.05	-.12
Comm	-.25**	.18*	.17*	.56**	.17*	-1.00	-.26**	.23*	.24	.64**	.02	-.09
School eng	-.22*	.15*	.02	.07	.74**	-.55**	-.22*	.09	.18*	.03	.85**	-.51**
Risk	.27**	-.22**	-.17*	-.18*	-.36**	.70**	.38**	-.21	-.16*	-.15	-.46**	.82**
W4												
Vulnerability	.45**	-.20*	-.21*	-.04	-.25**	.23**	.59**	-.23*	-.38**	-.20*	-.14	.18*
Family	-.24**	.28**	.15*	.23*	.11	-.07	-.34**	.38**	.31**	.30**	.18*	-.15*
School env	-.20*	.02	.27**	.11	.03	-.07	-.33**	.17*	.45**	.31**	.04	-.08
Comm	-.37**	.23**	.15*	.52*	.05	-.12	-.33**	.15	.24*	.66**	-.08	-.08
School eng	-.34**	.17*	.05	.06	.64**	-.54**	-.27**	.18*	.27**	.14	.78**	-.60**
Risk	.26**	-.23**	-.21*	-.16*	-.32**	.60	.30**	-.25**	-.17*	-.12	-.40	.79**

	Wave 3						Wave 4					
	Vuln	Family	School env	Comm	School eng	Risk	Vuln	Family	School env	Comm	School eng	
W3												
Vulnerability	-											
Family	-.31**	-										
School env	-.29**	.22*	-									
Comm	-.19*	.20*	.31**	-								
School eng	-.25**	.28**	.06	.13	-							
Risk	.35**	-.31**	-.16*	-.14*	-.46**	-						
W4												
Vulnerability	.63**	-.28**	-.24**	-.23*	-.21*	.23*	-					
Family	-.43**	.51**	.24**	.25**	.20*	-.18*	-.38**	-				
School env	-.35**	.24**	.50**	.27**	.07	-.20*	-.44**	.36**	-			
Comm	-.22*	.23*	.32**	.64**	-.03	-.17*	-.41**	.32**	.38**	-		
School eng	-.30**	.22*	.15*	.12	.88**	-.53**	-28**	.20*	.13*	.11	-	
Risk	.35**	-.27**	-.25**	-.18*	-.38**	.87**	.28**	.20*	-.22**	-.10	-.49**	

Vuln = vulnerability (depressive and conduct disorders symptoms), family = family environment, school env = school environment, comm = community environment, school eng = school engagement, risk = risk behaviours

Table 3. *Unconditional growth models*

	School engagement				Risk behaviours			
	B	*SE*	*t / Wald Z*	*95% CI*	*B*	*SE*	*t / Wald Z*	*95% CI*
Fixed effects								
Intercept	4.66	.04	129.03**	4.59, 4.73	2.52	.20	12.54**	2.13, 2.92
Linear term	-.08	.03	-2.50*	-.14, -.02	.74	.17	4.35**	.41, 1.08
Random effects								
Residual	.30	.03	11.29**	.25, .36	10.97	.83	13.27**	9.46, 12.71
Variance	.08	.01	5.63**	.05, .11	1.20	.30	3.96**	.73, 1.96
Model fit								
-2 Log Likelihood			1482.24				3948.98	

Table 4. *Time-invariant and time-varying predictors added to the unconditional growth models, predicting school engagement and risk behaviours*

	School engagement				Risk behaviours			
	B	*SE*	*t*	*95% CI*	*B*	*SE*	*t*	*95% CI*
Fixed effects								
Intercept	4.75	.06	78.22**	4.63, 4.87	2.43	.32	7.49**	1.79, 3.07
Age	-.31	.05	-6.80**	-.40, -.22	2.06	.23	8.80**	1.60, 2.52
Sex[a]	.09	.09	1.01	-.09, .27	-.76	.48	-1.58	-1.70, .18
Linear term	-.14	.05	-2.88*	-.23, -.04	.99	.25	4.00**	.50, 1.47
Age	-.02	.04	-.43	-.09, .06	-.21	.19	-1.13	-.59, .16
Sex	-.08	.07	-1.11	-.22, .06	.17	.37	.47	-.54, .89
Time-varying predictors								
Vulnerability	-.13	.03	-3.90**	-.20, -.07	.69	.18	3.86**	.34, 1.04
Resilience	.00	.04	.04	-.07, .08	.05	.19	.27	-.33, .43
Community environment	.06	.03	1.96	.00, .13	-.18	.16	-1.10	-.50, .14
School environment	.05	.03	1.35	-.02, .11	-.35	.17	-2.02†	-.70, -.01
Family environment	-.08	.03	-2.22†	-.15, -.01	.05	.18	.27	-.30, .40
Random effects								
Residual	.28	.03	9.14**	.23, .35	9.43	.94	10.06**	7.76, 11.45
Variance	.04	.01	3.65**	.03, .08	.25	.27	.91	.03, 2.14
Model fit								
-2 Log Likelihood			866.26				2353.07	

Note: The time-invariant predictors (age, sex) were measured at Wave 1. † $p < .05$,* $p < .01$, ** $p < .001$, [a] Reference group: female

Table 5. *Moderation models of the effect of individual vulnerability, resilience, and community environment on school engagement and risk behaviours*

	School engagement				*Risk behaviours*			
	β	*SE*	*t*	*95% CI*	*β*	*SE*	*t*	*95% CI*
Fixed effects								
Intercept	4.78	.06	77.04**	4.66, 4.89	2.28	.33	6.94**	1.63, 2.92
Age	-.31	.05	-6.73**	-.40, -.22	2.02	.23	8.72**	1.56, 2.47
Sex[a]	.06	.09	.71	-.11, .24	-.59	.47	-1.26	-1.52, .33
Linear term	-.15	.05	-3.08*	-.24, -.05	1.05	.24	4.29**	.57, 1.53
Age	-.31	.05	-6.73**	-.40, -.22	-.19	.19	.31	-.56, .18
Sex	.06	.09	.71	-.11, .24	.12	.36	.32	-.60, .83
Time-varying predictors								
Vulnerability	-.17	.04	-4.70**	-.24, -.10	.84	.19	4.51**	.47, 1.20
Resilience	.00	.04	-.09	-.08, .08	.01	.20	.05	-.39, .41
Community environment	.11	.04	3.13*	.04, .18	-.39	.18	-2.16†	-.74, -.03
School environment	.05	.03	1.41	-.02, .11	-.36	.17	-2.10†	-.70, -.02
Family environment	-.07	.03	-1.97†	-.14, .00	.04	.18	.20	-.31, .39
Interactions								
Resilience* Community environment	-.06	.04	-1.73	-.14, .01	.40	.19	2.15†	.04, .77
Resilience*Vulnerability	.03	.03	.97	-.03, .09	.06	.17	.36	-.27, .39
Vulnerability*Community environment	-.02	.03	-.71	-.08, .04	-.02	.16	-.09	-.34, .31
Resilience*Vulnerability*Community environment	.10	.03	3.11*	.04, .16	-.46	.17	-2.73*	-.80, -.13
Random effects								
Residual	.27	.03	9.09**	.22, .34	8.79	.90	9.76**	7.19, 10.74
Variance	.04	.01	3.72**	.03, .07	.41	.28	1.45	.11, 1.57
Model fit								
-2 Log Likelihood			854.72				2342.11	

† $p < .05$,* $p < .01$, ** $p < .001$, [a] Reference group: female

Figure 1. Theorized relationship among study variables.

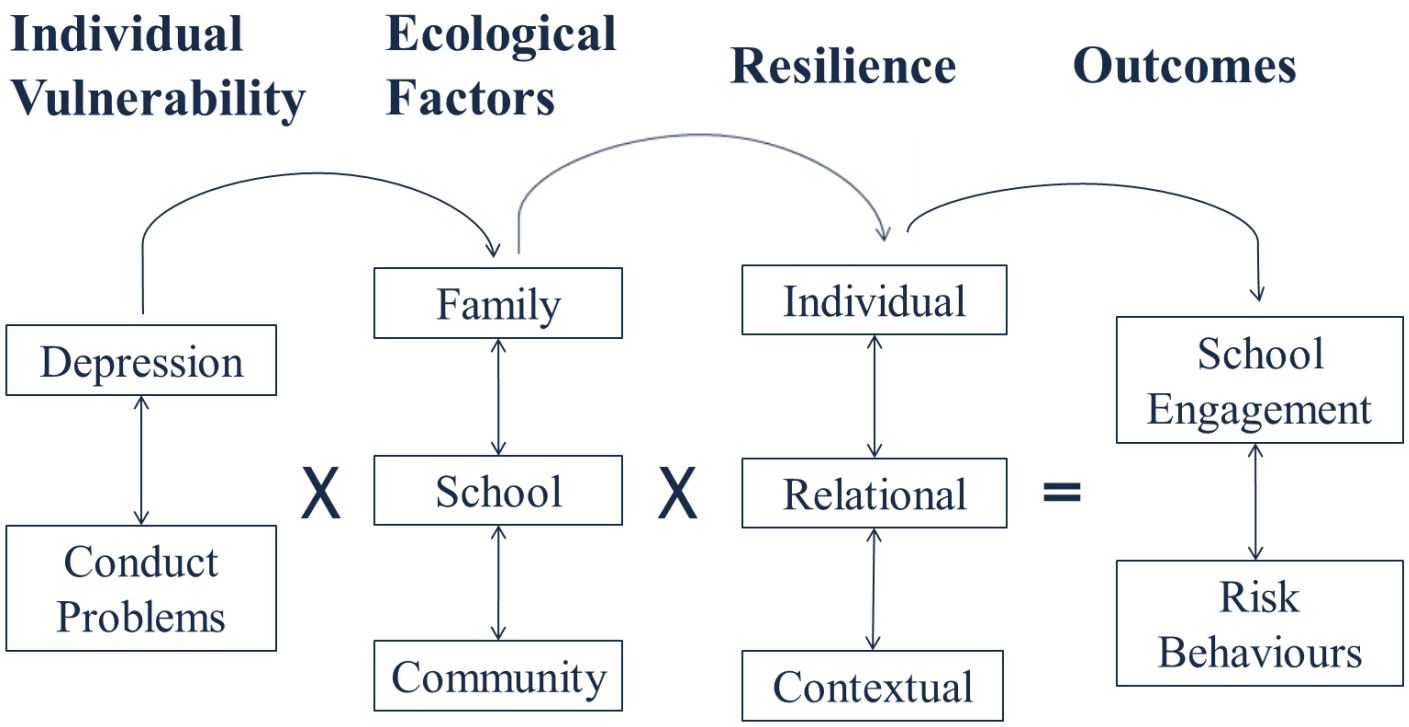

Figure 2. School engagement

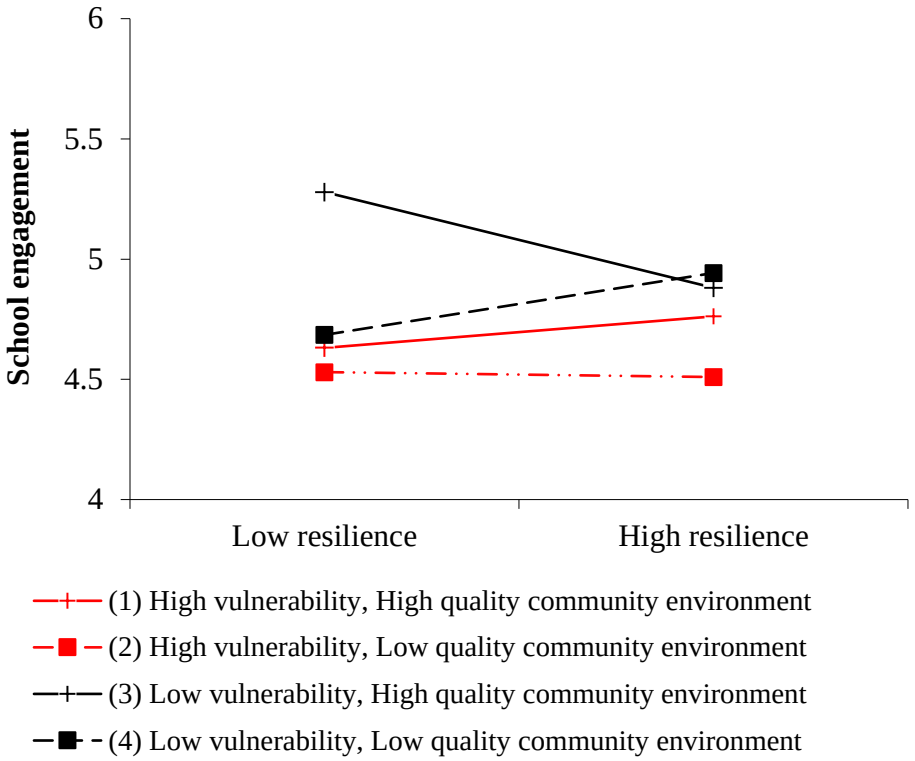

Figure 3. Risk behaviours